

Note on the Celestial Photographs made at the Yerkes Observatory by Mr. G. W. Ritchey, and recently presented to the Society.

When the photographs of the *Orion* nebula and the *Andromeda* nebula were shown on the screen at the meeting of the Society on March 13 the question was raised whether any selective process of development or printing had been used in order to preserve the detail in the bright central portions while the faint extensions are brought up. In a letter to Mr. Hinks, dated 1903 April 2, Mr. Ritchey has given the following account of his methods of development, with permission to make it known to the Society. This account was the subject of a discussion at the meeting on May 8, and the wish was expressed that it should be printed in the *Monthly Notices*.

"For ten years I have developed all my negatives with Rodinal, a concentrated (one solution) liquid developer prepared after Andresen's formula. According to directions, one part of Rodinal is to be used with thirty parts of water for normal exposures. This works slowly, and gives a rather thin negative—not strong and brilliant, but rich in detail. The directions prescribe Rodinal one part, water forty parts, for undertimed negatives; and Rodinal one part, water twenty parts, for overtimed negatives. In developing astronomical negatives I begin with a very weak solution, Rodinal one part, water 120 parts, and develop for one hour, increasing the strength of the developer gradually every ten minutes, until the proportion becomes Rodinal one part, water sixty parts, for the last ten minutes of the hour. The slow development gives faint detail; the long development gives strength; the slow delicate development, without forcing, keeps the detail fine by avoiding the spreading of the images and coarseness of grain of plate. Double stars, for example, which would appear run together on account of the spreading of the images—were developer of normal strength used—are kept sharply separated. Rodinal allows prolonged development without chemical fog; it is best to use distilled water with it.

"This procedure gives negatives without great contrasts. All plates are backed to prevent halation while being exposed in the telescope.

"But in the case of such objects as the *Orion* and *Andromeda* nebulae something more than the above is needed if the detail in the bright central parts and the faint extensions are both to be shown on the same positive. One negative is reserved precisely as developed by the above method. For transparencies and lantern slides a second negative is exposed in the telescope, developed as above described, and the parts which are so dense that they cannot be printed are reduced locally by

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the use of very weak reducing solution. Much time and care are given to this, and an attempt is made to keep the relative brightness of the various parts the same in kind, though not in degree, as in the unreduced negative, which is constantly used for comparison during the process."

On the Verification of the Newtonian Law.

By Ernest W. Brown, F.R.S.

In the *Monthly Notices* for March and June 1897 I gave the results of an attempt to find out the degree of accuracy with which the theoretical values of the mean motions of the lunar perigee and node could be determined with the new data then available. My computations in the lunar theory had proceeded sufficiently far to enable me to give accurately the parts of these motions inclusive of the squares of the eccentricities and inclinations; the remaining parts, due to the direct action of the Sun, were estimated from Delaunay's literal expressions. Owing to the fact that some of Delaunay's higher terms were rather doubtful, that they only included two powers of m at most, and that slow convergence rendered an estimate of the remainders very doubtful, it was expedient to assign possible errors to the results quite large in comparison with the magnitudes of the terms which were estimated. They were set down in the second paper as follows:—

Mean Motions per annum.

	For the Perigee.	For the Node.
Calculated,	$+146\ 434''\cdot6 \pm 1''\cdot8,$	$-69\ 679''\cdot3 \pm 1''\cdot1;$
Hansen,	$+146\ 434''\cdot0,$	$-69\ 676''\cdot8;$
Observed,	$+146\ 435''\cdot6,$	$-69\ 679''\cdot5.$

It was noted that the possible error $\pm 1''\cdot8$ prevented any new discussion in the case of the perigee, but that the smaller possible error $\pm 1''\cdot1$ showed that Hansen's theoretical result for the node was wrong by at least $1''\cdot4$.

A short time ago my calculations in the lunar theory reached a stage which made it possible to include in the theoretical values the terms of the fourth order with respect to the eccentricities, inclination, and ratio of the parallaxes, so far as these produced a sensible effect. Although the final verifications are not yet complete, the results have been tested sufficiently to permit of their publication with confidence in their substantial